178

SERVICE MANUAL & PARTS LIST

(without price)

ELECTRONIC KEYBOARD

EP-30

JAN. 1988

EP-30

CASIO®

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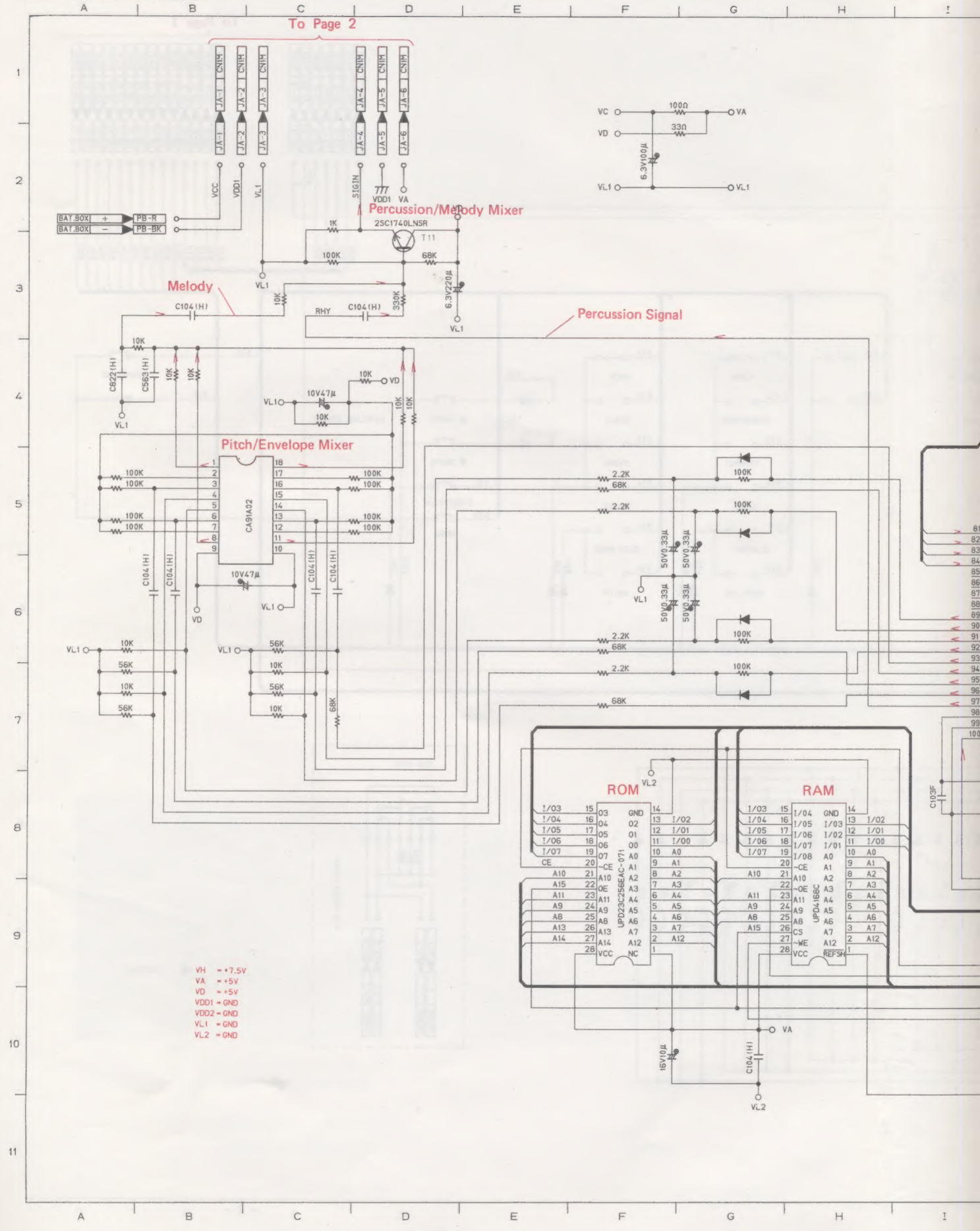

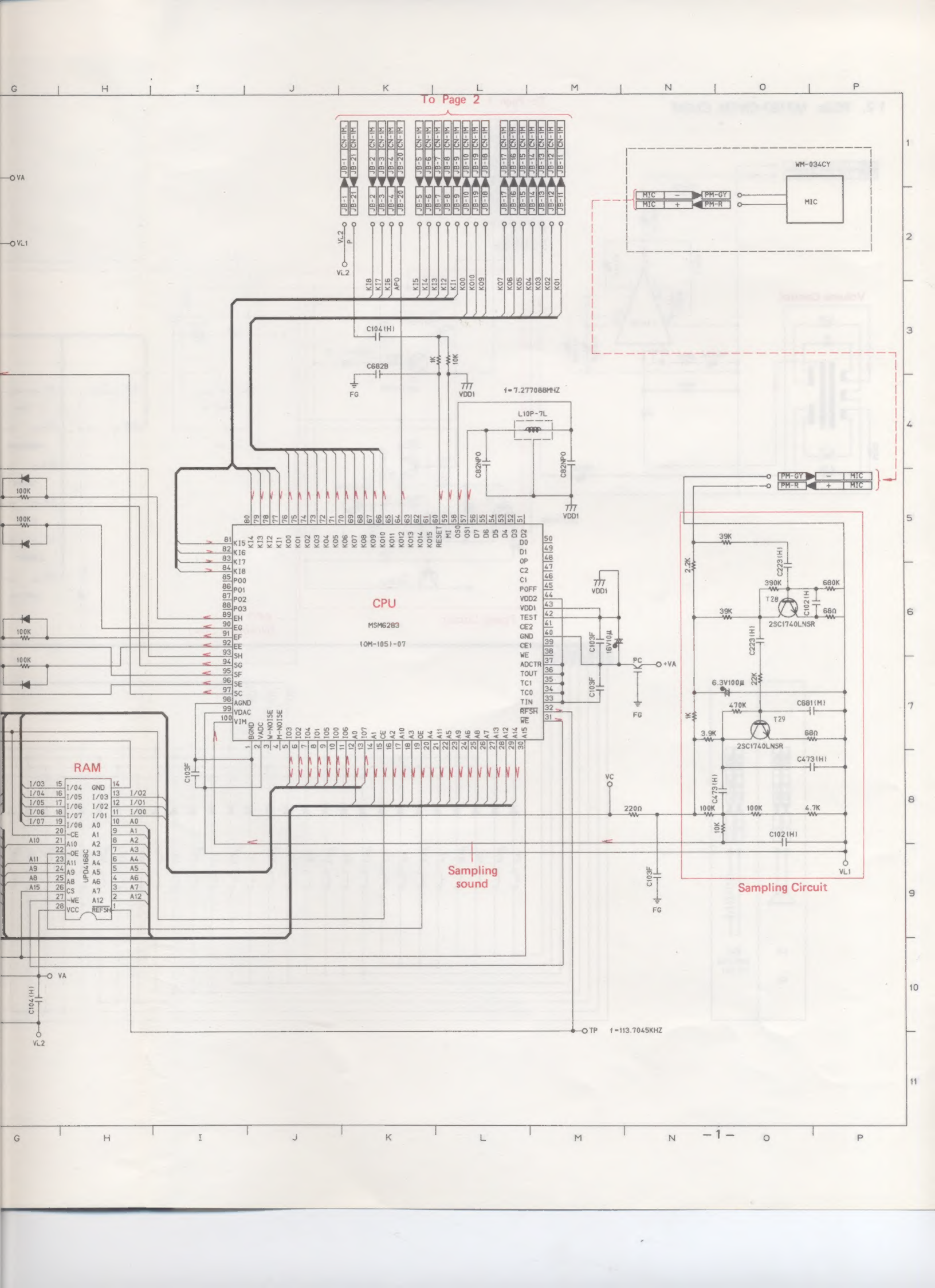
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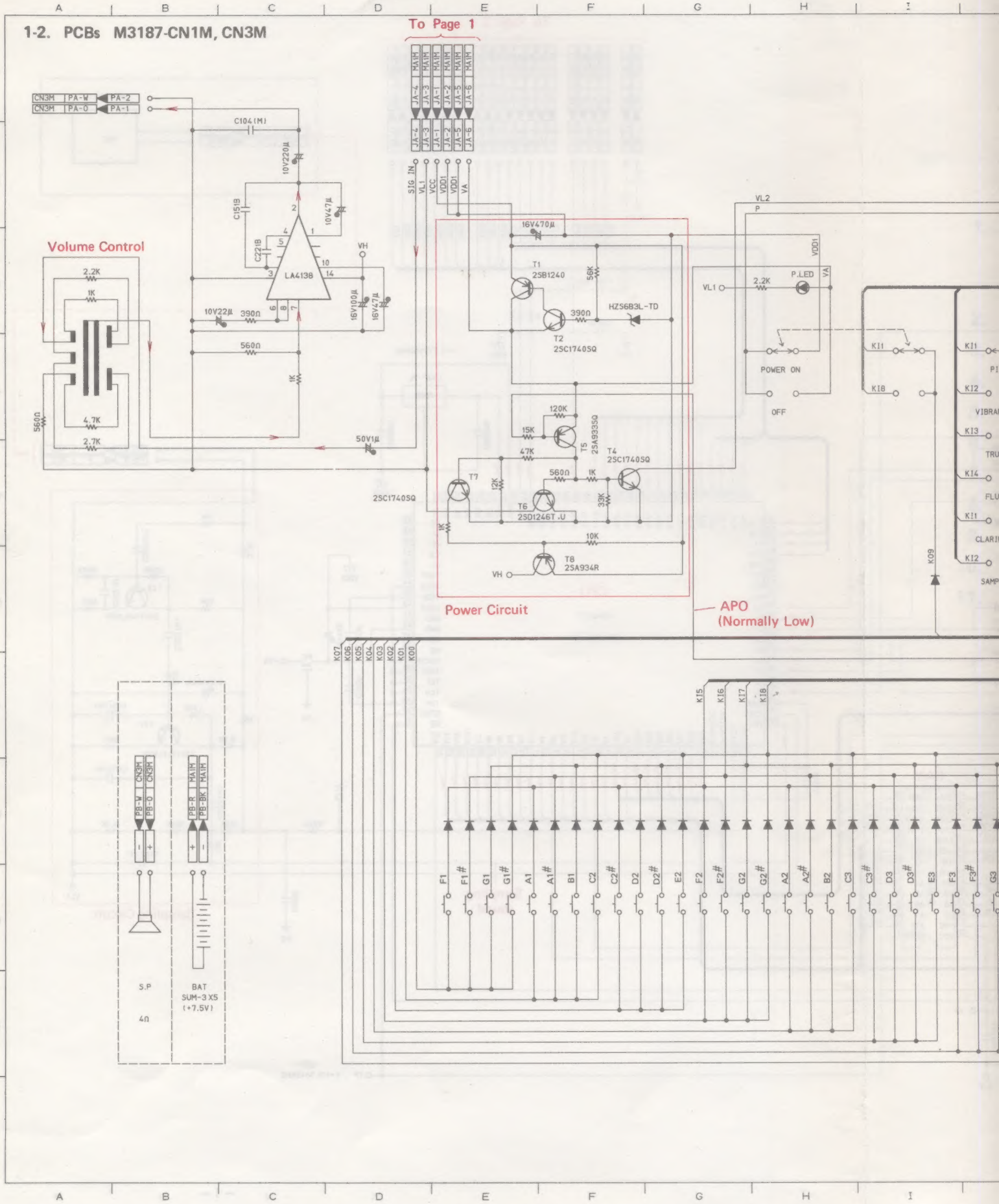

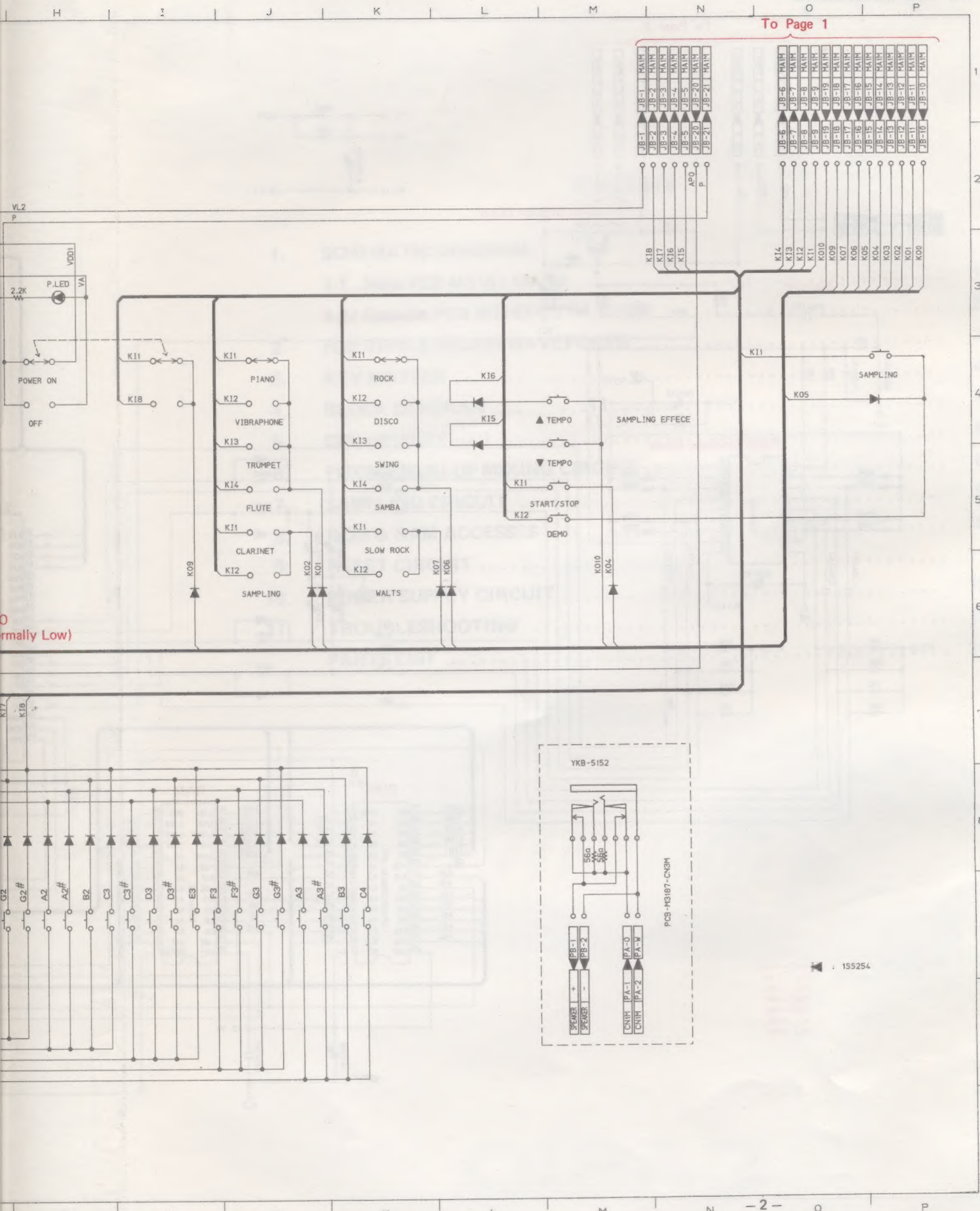
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JB-1 MAIM
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JB-12 MAIM
JB-11 MAIM
JB-10 MAIM
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G2
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B2
C3
C3#
D3
D3#
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PA-1
PA-2
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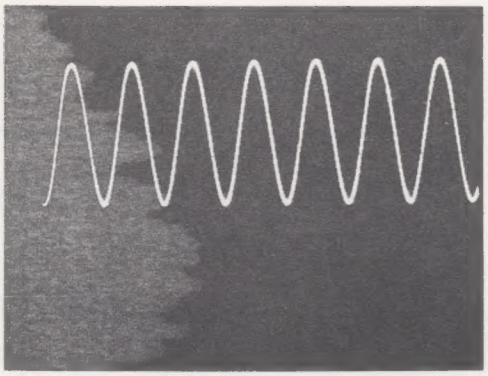
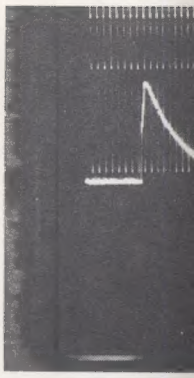
SPEAKER
CN1M
CN1M
: 1SS254

2. PCB VIEW & MAJOR WAVEFORMS

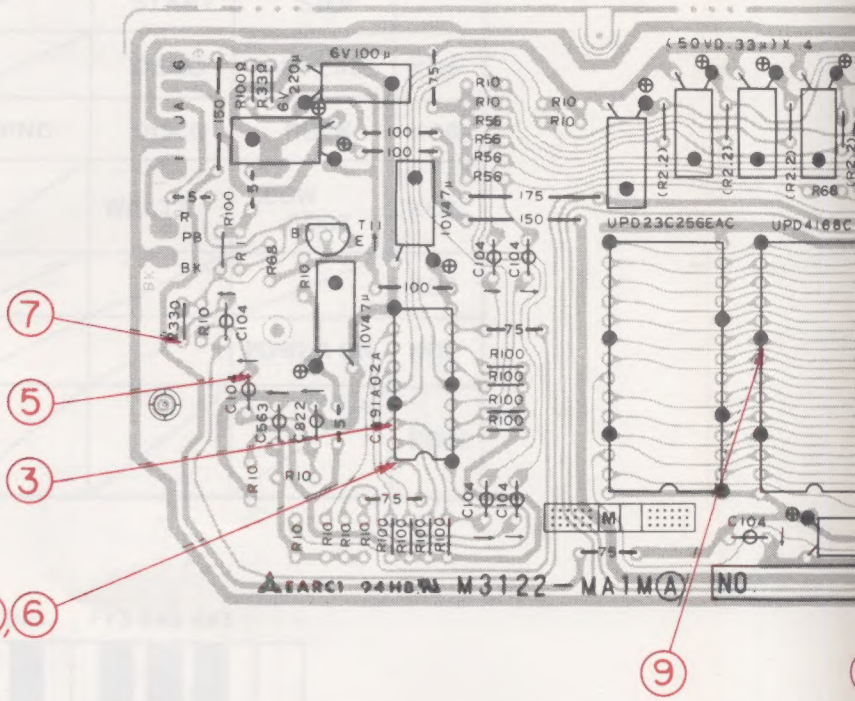
Note: Probe reduction: 10:1

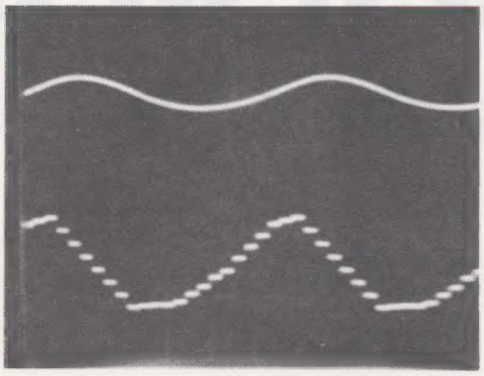


① Clock Pulse Signal
0.1V/div, 0.1μS/div



② Reset Signal
0.2V/div, 2mS

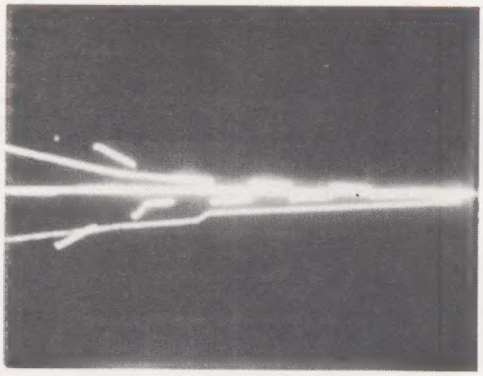




⑤ Melody signal
20mV/div, 0.2mS/div

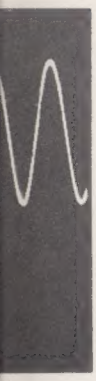
⑥ Mixing signal for merody
20mV/div, 0.2mS/div

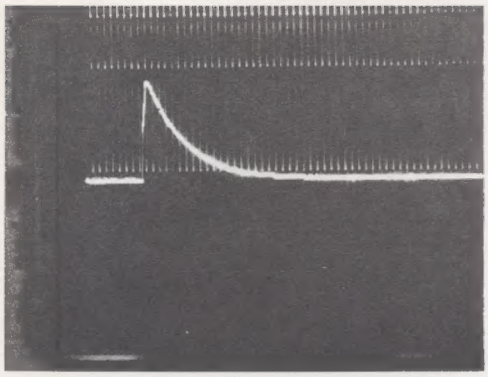
Tone: Flute, Key: A2



⑦ Percussion signal
0.2V/div, 5mS/div

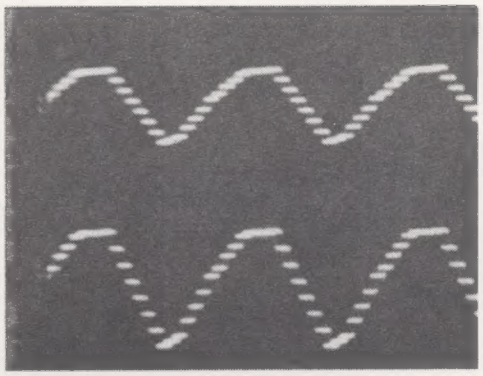
Rhythm: Rock, Tempo: Max.





② Reset Signal
0.2V/div, 2mS/div

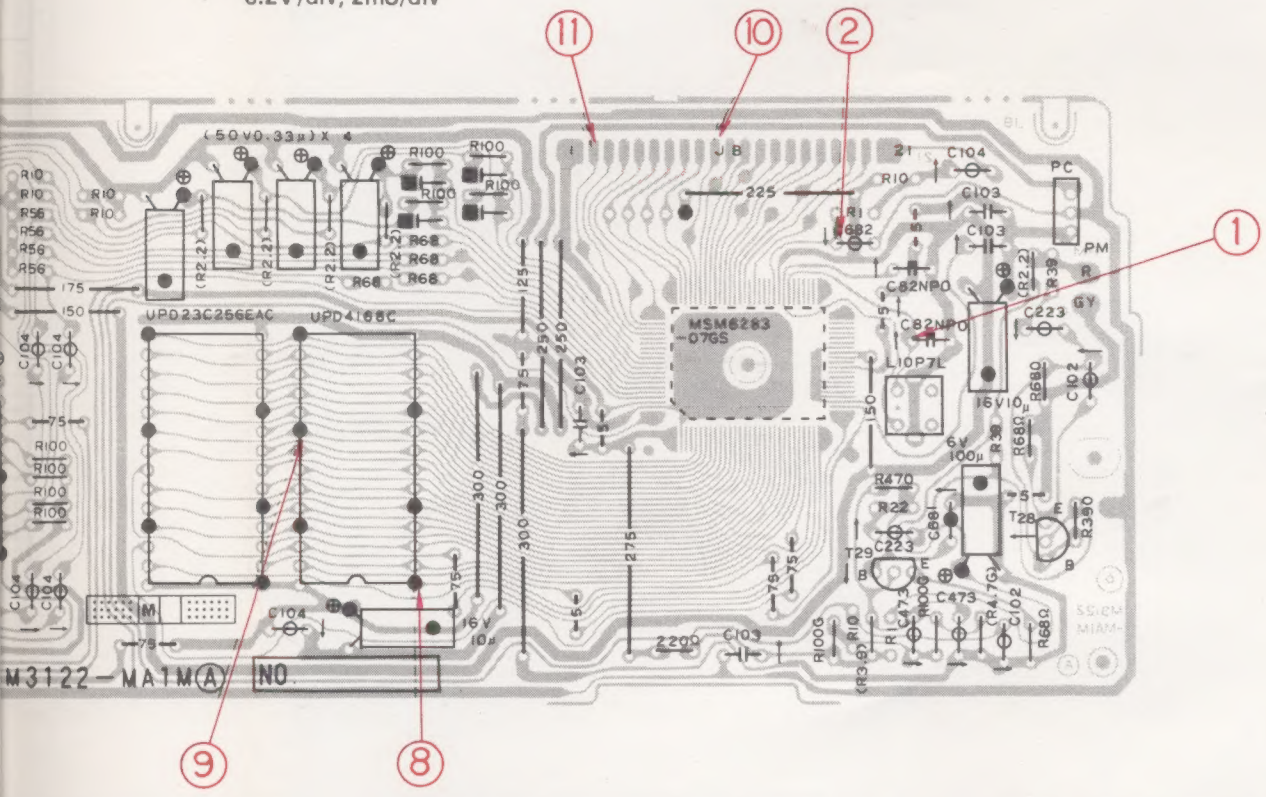
③
④



③ Pitch signal for merody
50mV/div, 0.2mS/div

④ Mixing signal for merody
50mV/div, 0.2mS/div

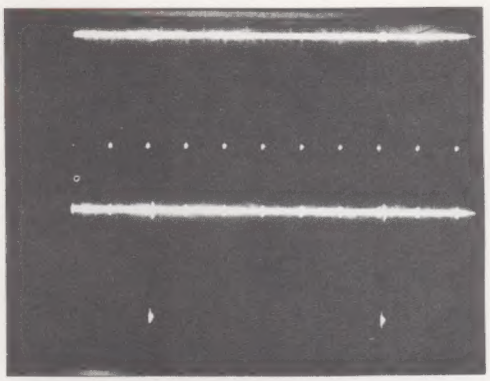
Tone: Flute, Key: A2



ignal
nS/div

ock, Tempo: Max.

⑧
⑨

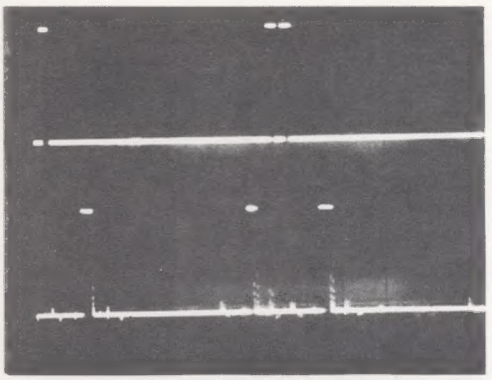


⑧ Refresh signal
0.2V/div, 10μS/div

⑨ CE signal
0.2V/div, 10μS/div

Tone: Sampling, Key: G3

⑩
⑪

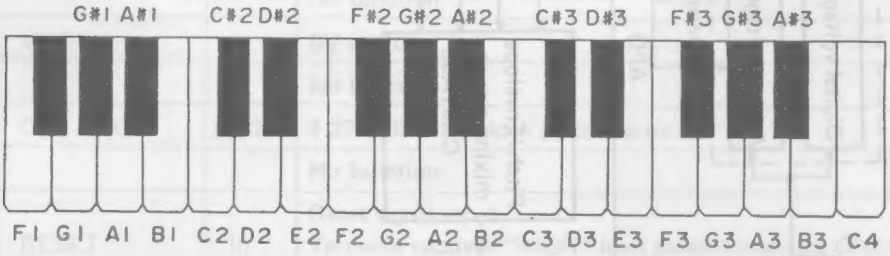


⑩ Key common signal KO0
0.2V/div, 0.5mS/div

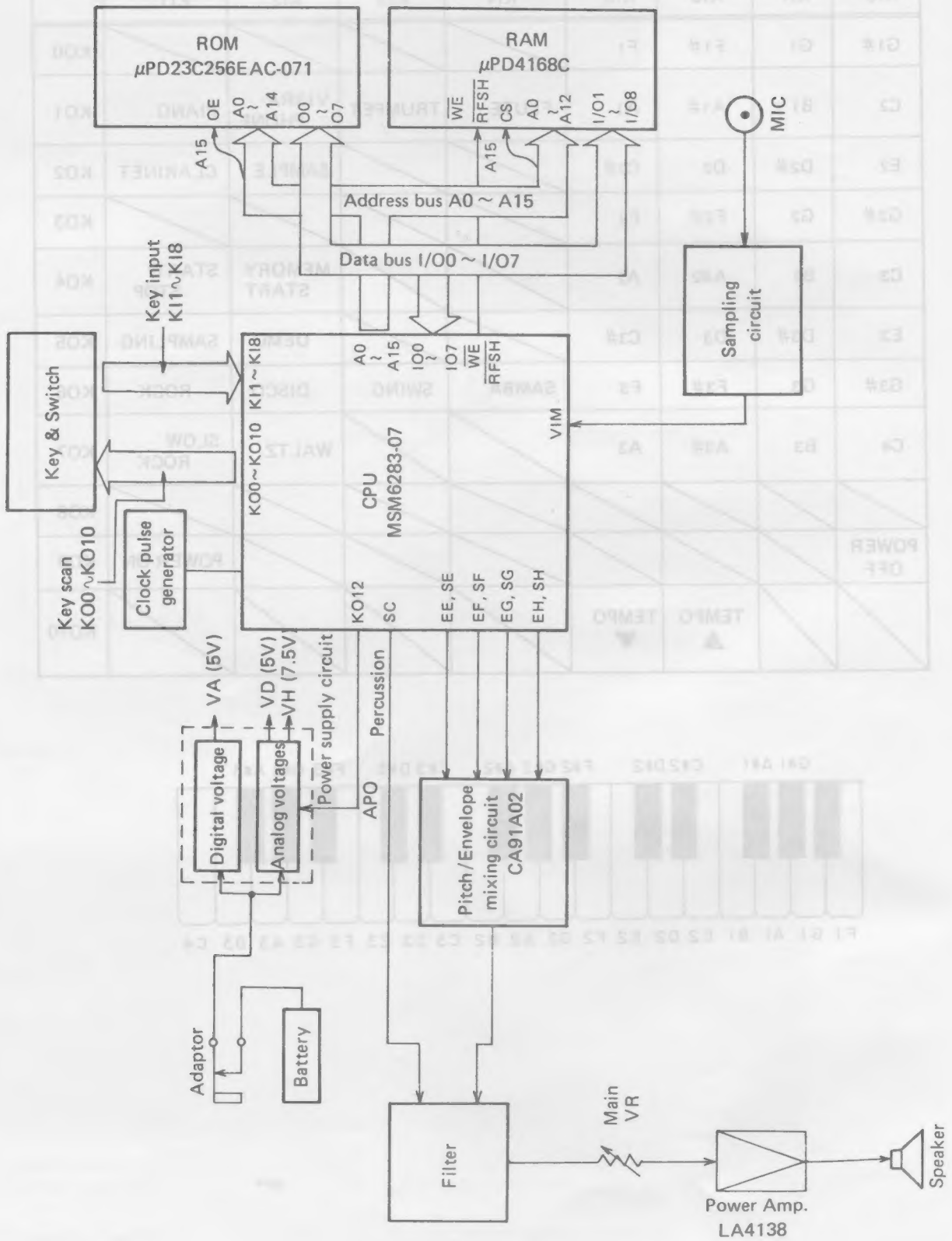
⑪ Key input signal KI8
0.2V/div, 0.5mS/div

3. KEY MATRIX

KI8	KI7	KI6	KI5	KI4	KI3	KI2	KI1	
G1#	G1	F1#	F1					KO0
C2	B1	A1#	A1	FLUTE	TRUMPET	VIBRA-PHONE	PIANO	KO1
E2	D2#	D2	C2#			SAMPLE	CLARINET	KO2
G2#	G2	F2#	F2					KO3
C3	B2	A#2	A2			MEMORY START	START/ STOP	KO4
E3	D3#	D3	C3#			DEMO	SAMPLING	KO5
G3#	G3	F3#	F3	SAMBA	SWING	DISCO	ROCK	KO6
C4	B3	A3#	A3			WALTZ	SLOW ROCK	KO7
								KO8
POWER OFF							POWER ON	KO9
		TEMPO ▲	TEMPO ▼					KO10



4. BLOCK DIAGRAM



5. CPU (MSM6283-01GS)

- Generates pitch and envelope signals for melody, chord, bass, and obbligato sounds.
- Provides percussion sounds.
- Controls keys, switches, RAM, and ROM.

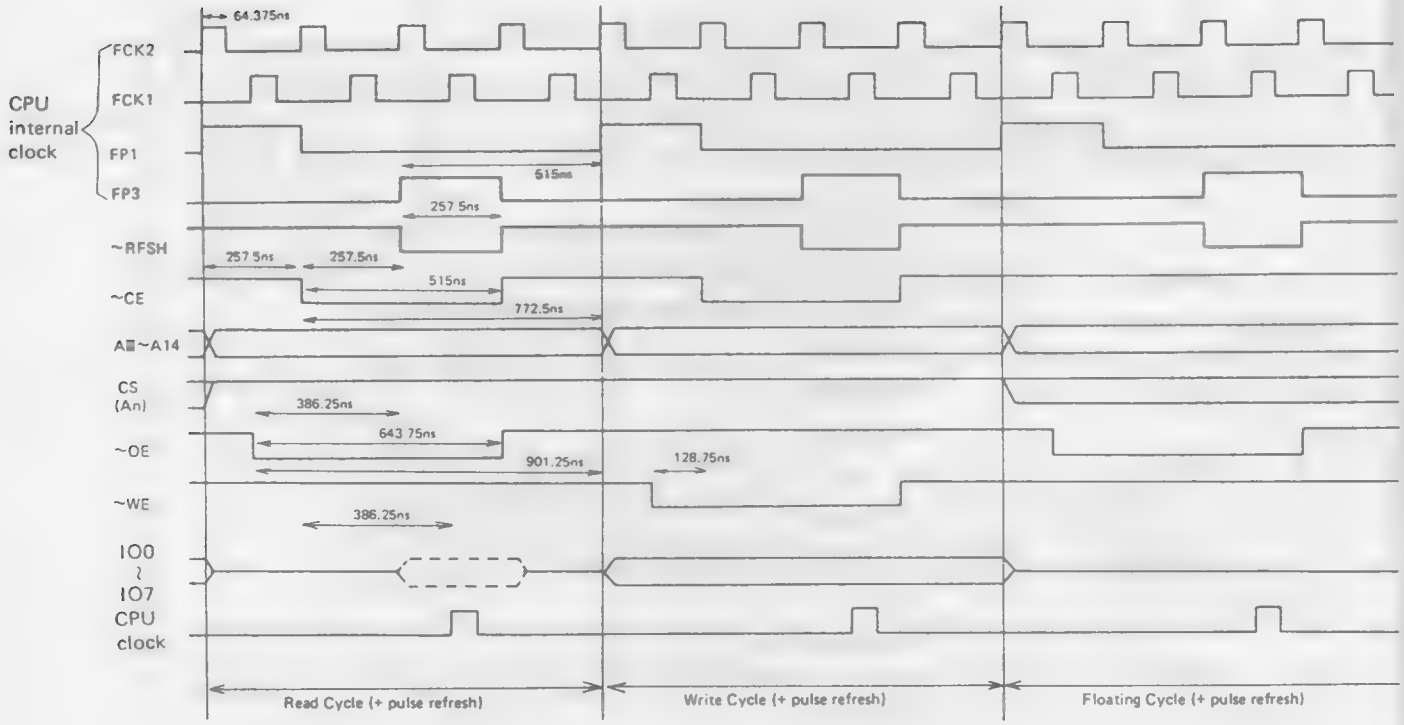
The following lists the pin functions of the CPU.
As the LSI works in negative logic, GND is +5V whereas power source is 0V.

Pin No.	Terminal Name	In/Out	Function
1	BGND		+5V source for ADC(Analog to Digital Converter)
2	VADC		Ground (0V) source for internal ADC
3, 4			0V source for ADC
5 ~ 11	IO0 ~ IO6	In/Out	Data bus (IO0 ~ IO6)
12	A0	Out	Address bus (A0)
13	IO7	In/Out	Data bus (IO7)
14	A1	Out	Address bus (A1)
15	$\overline{CE}$	Out	Chip enable signal for memory devices
16~18	A2, A10, A3	Out	Address bus (A2, A3, A10)
19	$\overline{OE}$	Out	Output enable signal for RAM
20~30	A4~9, A11~15	Out	Address bus (A4~9, A11~A15)
31	$\overline{WE}$	Out	Write signal output CPU writes data into memory devices when "HIGH"
32	$\overline{RFSH}$	Out	Refresh signal output CPU refreshes RAM memory data when "HIGH"
33~39			No function
40	GND		+5V source
41, 42			No function
43	VDD1		0V source
44~56			No function
57, 58	OSI, OSO	In/Out	7.277088 MHz clock pulse inputs
59			No function
60	RESET	In	Reset signal input Terminal receives "HIGH" level pulse initializing CPU internal circuits at power ON
61~63			No function
64	KO12	Out	APO (Auto Power Off) signal output Terminal rises to HIGH level to shut voltages off when the unit is not operated for approximately 7 minutes
65			No function
66~76	KO10 ~ KO0	Out	Key and switch common signals outputs
77~84	KI1 ~ KI8	In	Key and switch input signals
85~88			No function
89~92	EH~EE (4~1ch)	Out	Melody envelope signals outputs
93~96	SH~SE (4~1ch)	Out	Melody pitch signals outputs

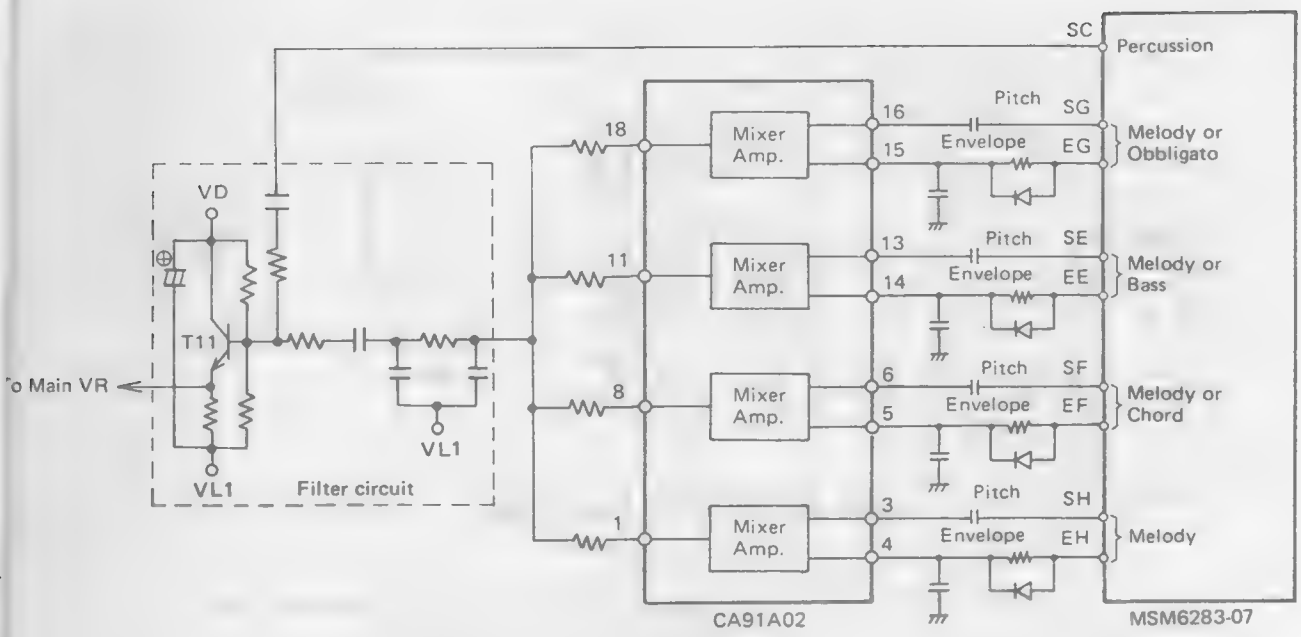
Speaker

Pin No.	Terminal Name	In/Out	Function
97	SC	Out	Percussion signal output
98	AGND		+5V source for DAC (Digital to Analog Converter)
99	VDAC		0V source for DAC
100	Vin	In	Sampling sound signal input from built-in MIC

CPU, RAM and ROM control time chart



6. PITCH/ENVELOPE MIXING CIRCUIT



CPU outputs four each of pitch and envelope signals.

Normally all the signals are for melody sounds however, when the demonstration music is played, each pitch and envelope signals become obbligato, bass, chord, or melody sounds.

CA91A 02 contains four mixing amplifiers and merges each pitch and envelope signals.

7. SAMPLING CIRCUIT

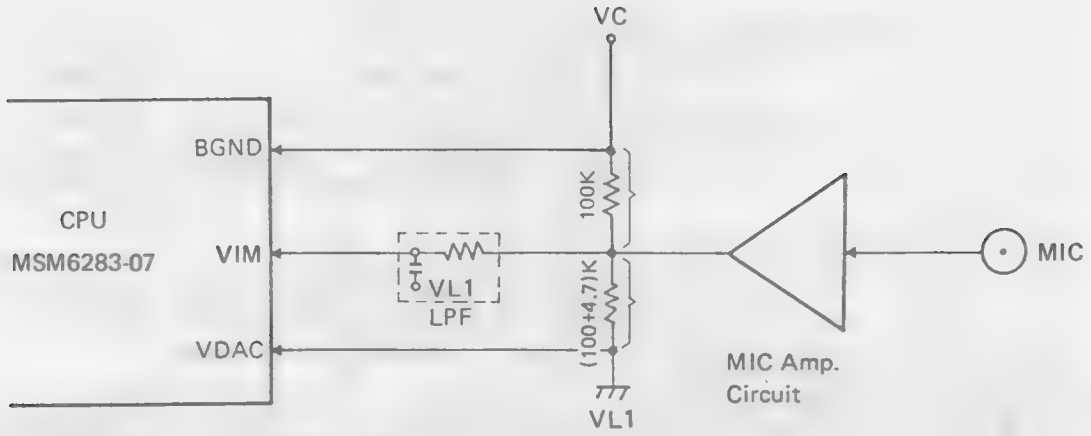


Fig. 1 Sample Sound Input Circuit

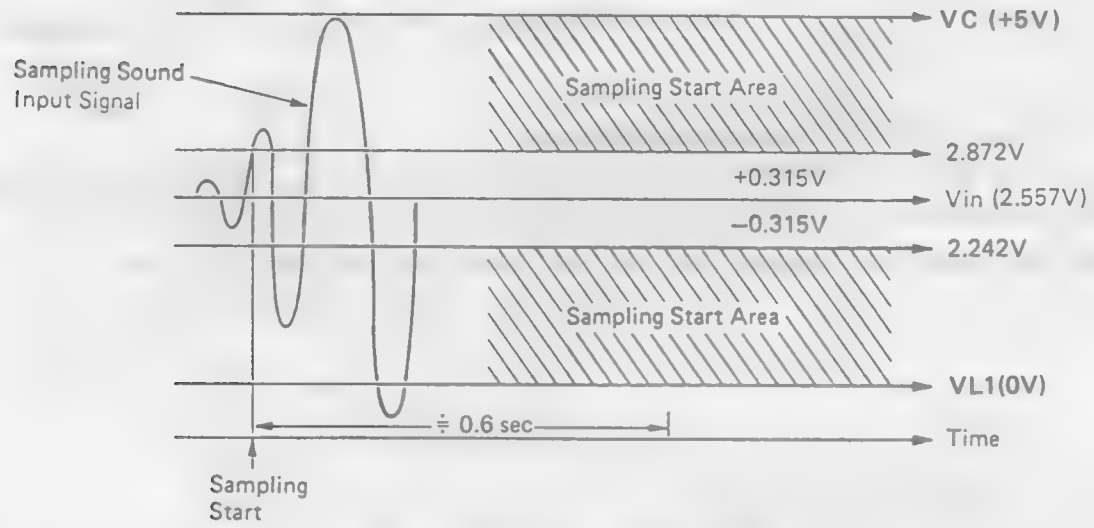


Fig. 2 VIM Input Trigger Level

As shown in Fig. 1, the circuit provides sampling signals to the VIM terminal of the CPU. Resistors 100Kohm and (100 + 4.7) Kohm bias the sampling signal on 2.557V.

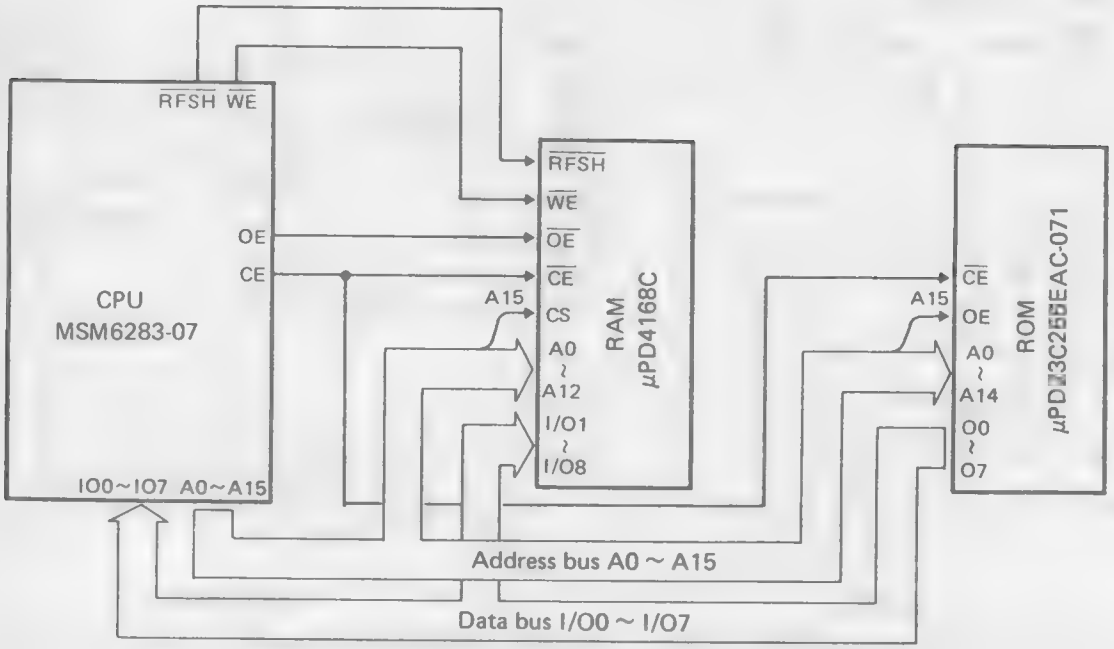
When the sampling sound level exceeds ± 0.315V as shown in Fig. 2, the CPU starts to transmit the sampling sound data to the RAMs.

While sampling, the CPU transmits the sampling sound data to the sampling RAMs directly.

While sampling, CPU does not output key common signals (KO0 ~ KO10) so that the keyboard becomes inoperative.

Sampled sounds are digitized in CPU and transmitted to the RAM.

8. ROM & RAM ACCESSES



The RAM is 64Kbit dynamic RAM. Since they are dynamic type, data must be refreshed every 2 milliseconds at least. The memory is used as the demonstration, memory play and sampling data area.

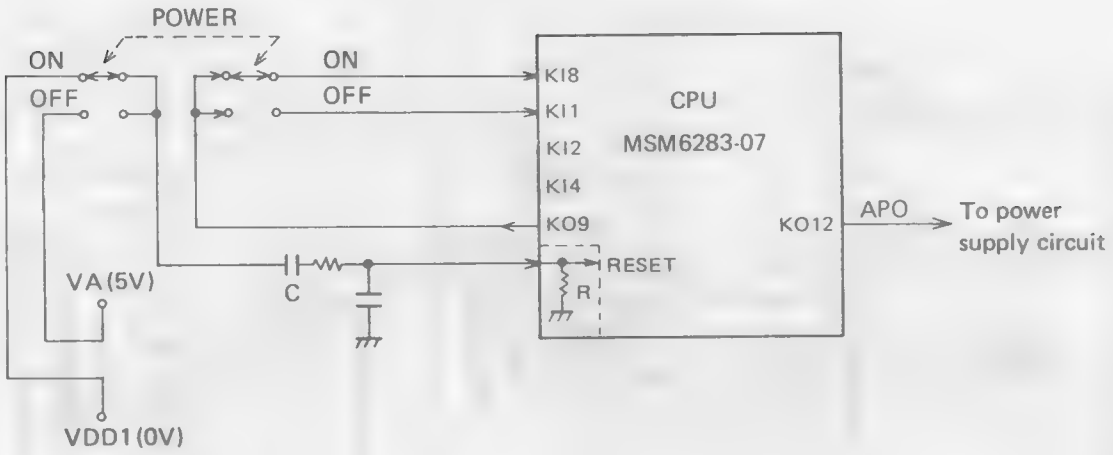
The capacity of ROM is 256Kbit and it contains the program for system execusion and the preset tone data.

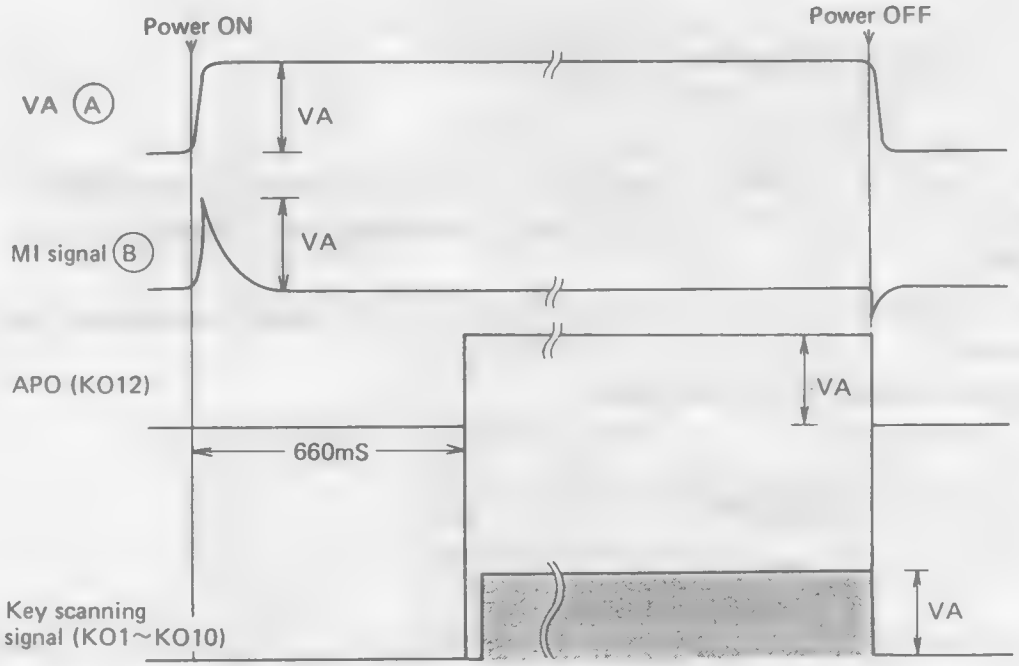
The chip select conditions are as shown below.

Signal / Chip	A15	$\overline{CE}$	$\overline{OE}$	$\overline{WE}$
RAM	L	L	L	L
ROM	H	L	X	X

H: High level
L: Low level
X: Irrelevant

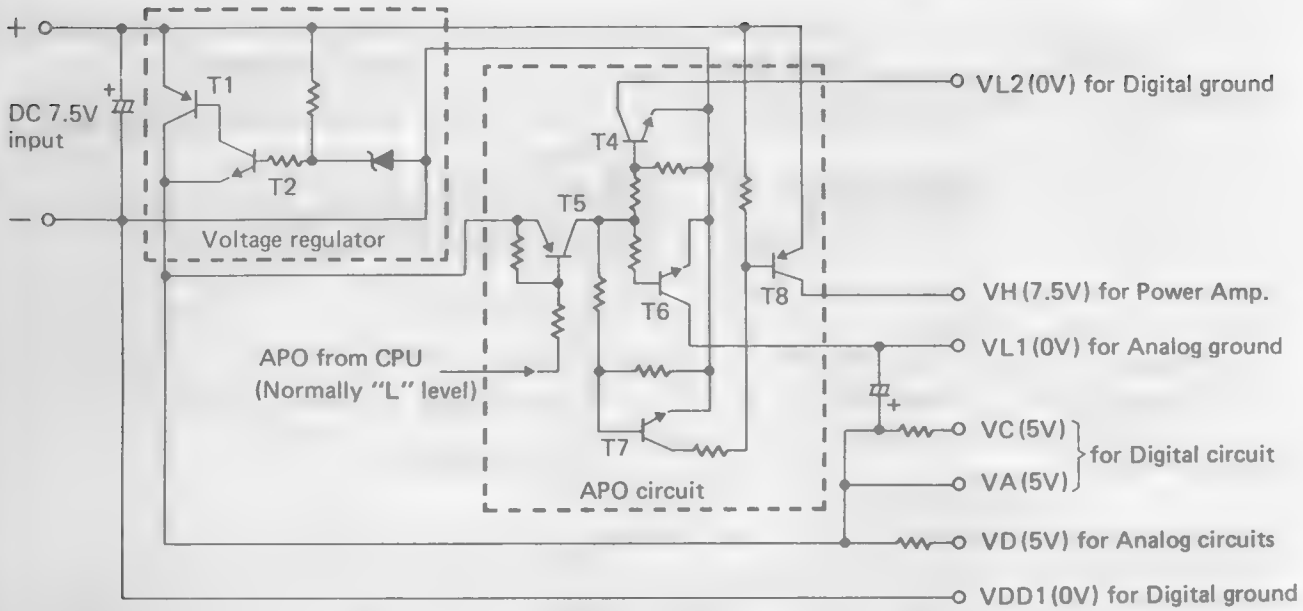
9. RESET CIRCUIT





At power ON, the CPU receives RESET signal as shown in the time chart by CR circuit. Then the CPU outputs APO (KO12) and key scanning signals, and starts controlling of peripheral circuits. Also, the CPU detects power switch OFF by receiving key common signal (KO9) in key input terminal (K18) and stops functioning.

10. POWER SUPPLY CIRCUIT



The power supply circuit consists of a voltage regulator and an APO (Auto Power Off) circuit.
Transistors T1, T2 and zener diode regulates the battery voltage at five volts.
When power is ON and operation is normal, the APO signal from the CPU maintains Low level.
Transistors T4 ~ T8 turn on providing the voltages to the circuits.
The signal APO becomes HIGH, when the unit is not operated for 7 minutes, transistors T4 ~ T8 turn off causing the voltages except VA (5V) to shut off.
Voltages VA (5V) and VDD (ground) are always provided to the CPU even at APO.
Transistors T1, T2 and zener diode from voltage regulator circuit.

11. TROUBLESHOOTING

Trouble	Faulty Block	Cause/Treatment
No power	Power supply circuit	Check voltages in accordance with the schematic diagram
	Power switch	Switch contacts and switch spring tension (Check waveform ②)
	CPU	Check waveform ⑩
	Pulse generator	Check waveform ①
No sound at all	Power circuit	Check voltages VH (7.5V), VL1 (0V)
	CPU	Check waveforms ③~⑦
	ROM	
	Mixing Amp.	Check emitter signal of transistor T11
	Power Amp.	Check output signal (pin 2) of Power Amp.
	Speaker	
No merody sound at all (Percussions sound OK)	Pitch/Envelope mixing circuit	Check waveforms ③~⑥
	ROM	
No rhythm sound at all (Merody sound OK)	CPU	Poor soldering of CPU (Check waveform ⑦)
	ROM	
Certain keys or switches do not respond	Dirty contact	Clean PCB CN1M and contact rubbers
	Poor soldering of diodes	Resolder diodes
	Poor contact of PC joiner	Check poor contact PC joiners
	CPU	Check poor soldering of CPU
Sampling impossible	Built-in MIC	
	Sampling circuit	Check collector signals of transistors T28 and T29
	CPU	
	RAM	
Distorted sound	Battery	Check the battery voltage
	Speaker	
	Power Amp.	Check output signal (pin 2) of Power Amp.
	Mixing Amp.	Check emitter signal of transistor T11

PARTS LIST

EP-30

Notes:
1. Prices and specifications are subject to change without prior notice.
2. As for spare parts order and supply, refer to the "GUIDEBOOK for Spare Parts Supply", published separately.
3. The numbers in item colum correspond to the same numbers in drawing.

Item	Code No.	Part Name	Specification	Q'ty	*	Unit Price N.R. Yen (¥) (FOB: JAPAN)	Rank
	1) M3122-MA1M PCB ASS'Y						
	2010 0056	LSI	UPD4168-15, 16	1			A
☆	2010 4039	LSI	MSM6283-07GS	1			A
☆	2010 4480	LSI	UPD23C256EAC-071	1			A
	21140252	Monolithic IC	CA91A02	1			A
	2220 1425	Transistor	2SC1740LNSR-TP-T	3	10		A
	2301 0275	Diode	1SS176-TPA7-T	4	20		C
	2606 0483	Carbon film resistor	R-20-100K-G-T24-T	2	20		C
	2606 0483	Carbon film resistor	R-20-4.7K-G-T24-T	1	20		C
☆	2609 0042	Carbon film resistor	ERD-S2TJ-334T-T	1	20		C
☆	2609 0049	Carbon film resistor	ERD-S2TJ-394T-T	1	20		C
☆	2609 0077	Carbon film resistor	ERD-S2TJ-680T-T	2	20		C
☆	2609 0147	Carbon film resistor	ERD-S1TJ-330T-T	1	20		C
☆	2616 0332	Carbon film resistor	ERD-S2TJ-101T-T	1	20		C
☆	2616 0375	Carbon film resistor	ERD-S2TJ-102T-T	3	20		C
☆	2626 0383	Carbon film resistor	ERD-S2TJ-222T-T	5	20		C
☆	2616 0405	Carbon film resistor	ERD-S2TJ-392T-T	1	20		C
☆	2616 0430	Carbon film resistor	ERD-S2TJ-103T-T	14	20		C
☆	2616 0448	Carbon film resistor	ERD-S2TJ-223T-T	1	20		C
☆	2616 0472	Carbon film resistor	ERD-S2TJ-563T-T	4	20		C
☆	2616 0537	Carbon film resistor	ERD-S2TJ-684T-T	1	20		C
☆	2616 0553	Carbon film resistor	ERD-S2TJ-683T-T	5	20		C
☆	2616 0596	Carbon film resistor	ERD-S2TJ-221T-T	1	20		C
☆	2616 0634	Carbon film resistor	ERD-S2TJ-104T-T	13	20		C
☆	2616 0715	Carbon film resistor	ERD-S2TJ-393T-T	2	20		C
☆	2616 0723	Carbon film resistor	ERD-S2TJ-474T-T	1	20		C
	2801 7189	Electrolytic capacitor	50RE2-R33-T14-T	4	20		C
	2804 6037	Electrolytic capacitor	10RE2-47-T14-T	2	20		C
☆	2804 6045	Electrolytic capacitor	6.3RE2-220-T14-T	1	20		C
	2805 3100	Electrolytic capacitor	16RE2-10-T14-T	2	10		C
	2807 1104	Electrolytic capacitor	6.3RE2-100-T14-T	2	20		C
	2813 0294	Semi-conductive capacitor	RT-C60TKYR223K-T	2	20		C
	2813 0560	Semi-conductive capacitor	DD408SR104K16-T	8	20		C
	2813 0644	Semi-conductive capacitor	RT-C40TKYR104K16-T	2	20		C
	2813 0679	Semi-conductive capacitor	DD407SR563K16-T	1	20		C
	2813 0826	Ceramic capacitor	DD003F103Z50-T	4	10		C
	2818 3682	Ceramic capacitor	RT-HE70TKCH820J-T	2	20		C

Note: ☆ — New parts
Q'ty — Quantity used per unit
* — Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

Item	Code No.	Part Name	Specification	Q'ty	*	Unit Price N.R. Yen (¥) (FOB: JAPAN)	Rank
	2819 5168	Semi-conductive capacitor	DD404SR822K25-T	1	20		C
	2819 5362	Semi-conductive capacitor	DD406SR473K16-T	2	20		C
	2819 5371	Semi-conductive capacitor	DD404SR682K25-T	1	20		C
	2825 0273	TF capacitor	ECQ-M1H681KF3-T	1	20		C
	2845 0021	Three porality capacitor	DS306-56B222M	1	20		C
	3841 0007	Coil	L10P-7L	1	10		C
☆	4307 8240	Blank PCB M3122-MA1M	M110091-1	1			X
	2) M3187-CN1M PCB ASS'Y						
	2129 8329	Linear IC	LA4138	1			A
☆	2250 0014	Transistor	2SA934R-T-103-T	1	10		A
☆	2250 0091	Transistor	2SA1266Y-AT-T	1	10		A
☆	2251 0168	Transistor	2SB1240R-TV6-T	1	10		A
	2252 0084	Transistor	2SC3198Y-AT-T	3	10		A
	2253 0217	Transistor	2SD1246T, U-AA-T	1	10		A
	2301 0275	Diode	1SS176-TPA7-T	41	20		C
	2360 0616	Zener diode	HZS6B3LTD-T	1	20		B
	2370 0112	LED	LN28RPX-(TT8)	1	20		B
	2616 0359	Carbon film resistor	ERD-S2TJ-391T-T	2	20		C
	2616 0367	Carbon film resistor	ERD-S2TJ-561T-T	3	20		C
	2616 0375	Carbon film resistor	ERD-S2TJ-102T-T	4	20		C
	2616 0383	Carbon film resistor	ERD-S2TJ-222T-T	2	20		C
	2616 0413	Carbon film resistor	ERD-S2TJ-472T-T	1	20		C
	2616 0430	Carbon film resistor	ERD-S2TJ-103T-T	1	20		C
	2616 0456	Carbon film resistor	ERD-S2TJ-333T-T	1	20		
	2616 0464	Carbon film resistor	ERD-S2TJ-473T-T	1	20		C
	2616 0472	Carbon film resistor	ERD-S2TJ-563T-T	1	20		
	2616 0502	Carbon film resistor	ERD-S2TJ-124T-T	1	20		C
	2616 0570	Carbon film resistor	ERD-S2TJ-123T-T	1	20		C
	2616 0626	Carbon film resistor	ERD-S2TJ272T-T	1	20		C
	2616 0669	Carbon film resistor	ERD-S2TJ153T-T	1	20		C
	2800 9007	Electrolytic capacitor	SME16VB-100(M)-T	1	20		C
	2801 7469	Electrolytic capacitor	ECE-A1CU471ZB-T	1	10		C
	2805 3134	Electrolytic capacitor	10RE2-22-T2-T	1	20		C
	2805 6559	Electrolytic capacitor	SME10VB-220(M)-T	1	20		C
	2805 6672	Electrolytic capacitor	SME10VB-47(M)-T	1	20		C
	2805 6699	Electrolytic capacitor	SME50VB-1(M)-T	1	20		C
	2805 6737	Electrolytic capacitor	SME16VB-47(M)-T	1	20		C
☆	2813 0882	Ceramic capacitor	DD003B221K50-T	1	20		C
☆	2813 0938	Ceramic capacitor	DD003B151K50-T	1	20		C

Note: ☆ – New parts
Q'ty – Quantity used per unit
* – Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
C: Others
X: No stock recommended

Item	Code No.	Part Name	Specification	Q'ty	*	Unit Price N.R. Yen (¥) (FOB: JAPAN)	Rank
	2830 9236	Mylar capacitor	NNMTP104K50-T	1	20		C
☆	3725 1120	PC joiner M122A	JSF00-21-50M	1	10		C
☆	4307 8390	Blank PCB M3187-CN1M	M110085-1	1			X
	3) M3187-CN3M PCB ASS'Y						
	2609 0098	Carbon film resistor	ERD-S2TJ-560T-T	2	20		C
	3501 0840	Jack	YKB21-5152	1			B
☆	4307 8380	Blank PCB M3187-CN3M	M310146-1	1			X
	4) UPPER CASE ASS'Y						
1	3831 0042	Speaker	KC06573	1			B
2	6909 7370	SL contact 9S	CSB-09S	2	20		B
3	6909 7380	SL contact 9D	CSB-09D	2	20		B
4	6910 9853	White key set 2.6	M2483C-3	1			C
5	6910 9961	Contact rubber M110	M31255A-1	1			B
6	6913 3220	Black key set 2.6	M2484-4	1			C
☆ 7	6913 7670	Upper case sub ass'y	M210103*1	1			C
☆ 8	6913 7680	Rubber button 187A	M410117-1	1	10		C
☆ 9	6913 7690	Rubber button 187B	M410118-1	1	5		C
☆ 10	6914 4260	Slide knob 187	M32712-2	2	10		C
☆ 11	6909 9280	Slide knob 187	M32712-1	1	10		C
☆ 12	6914 4280	Slide knob 187	M32712-3	1	10		C
	5) MIC 122 ASS'Y						
13	3830 9021	Condensor MIC	WM-034CY	1			A
14	6907 0321	Sponge 129	M42612A-1	1	20		X
	6) LOWER CASE ASS'Y						
☆ 15	6913 7630	Lower case sub ass'y	M210104*1	1			C
☆ 16	6913 7643	Battery cover sub ass'y	M31417C*22	1			C
17	6345 2238	Battery spring A-G55	A42606B-1	1	10		C
18	6912 2630	Battery spring 120	M42382-1	1			C

Note: ☆ – New parts
Q'ty – Quantity used per unit
* – Minimum order and supply quantity

Rank A: Essential
B: Stock recommended
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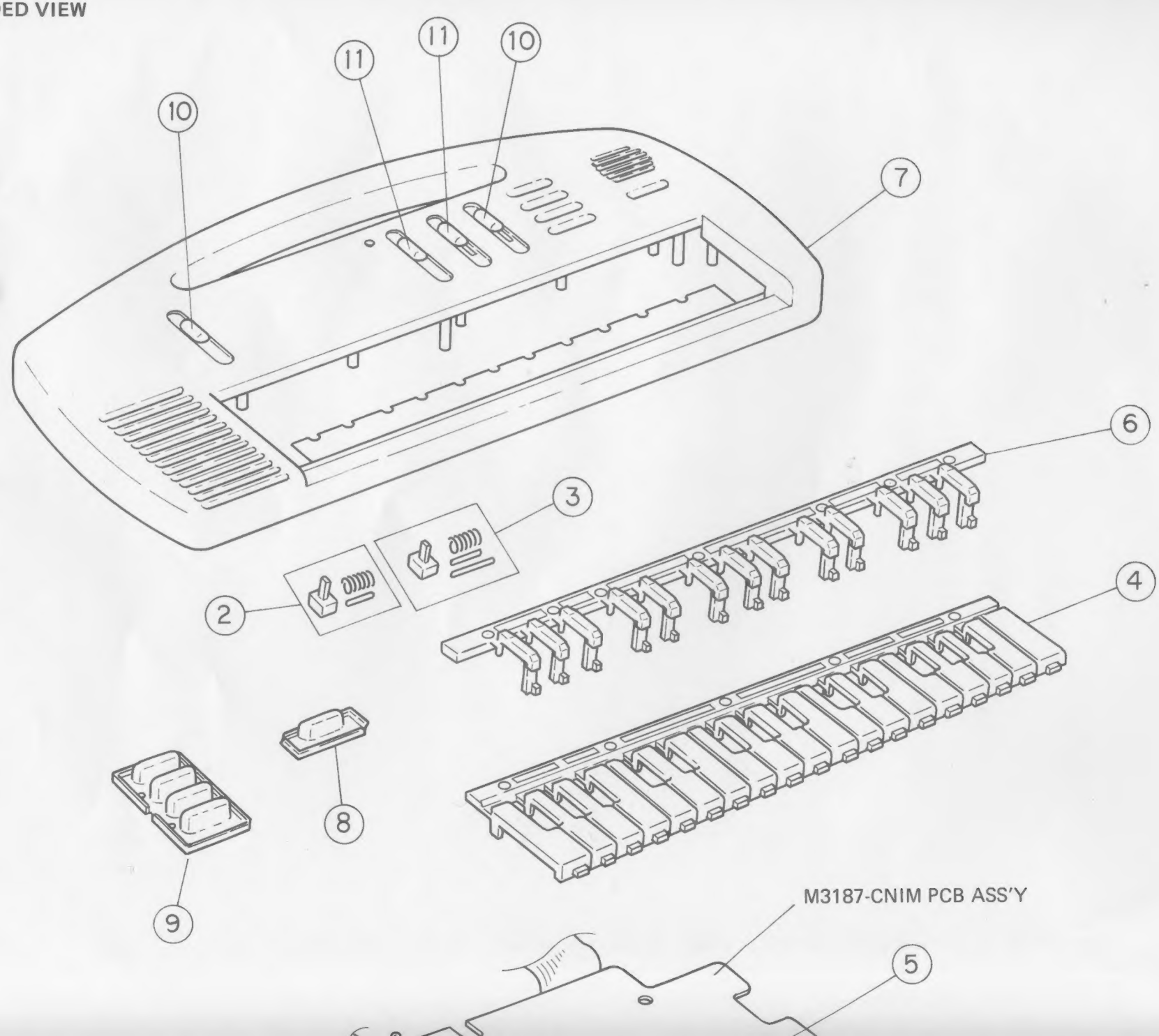
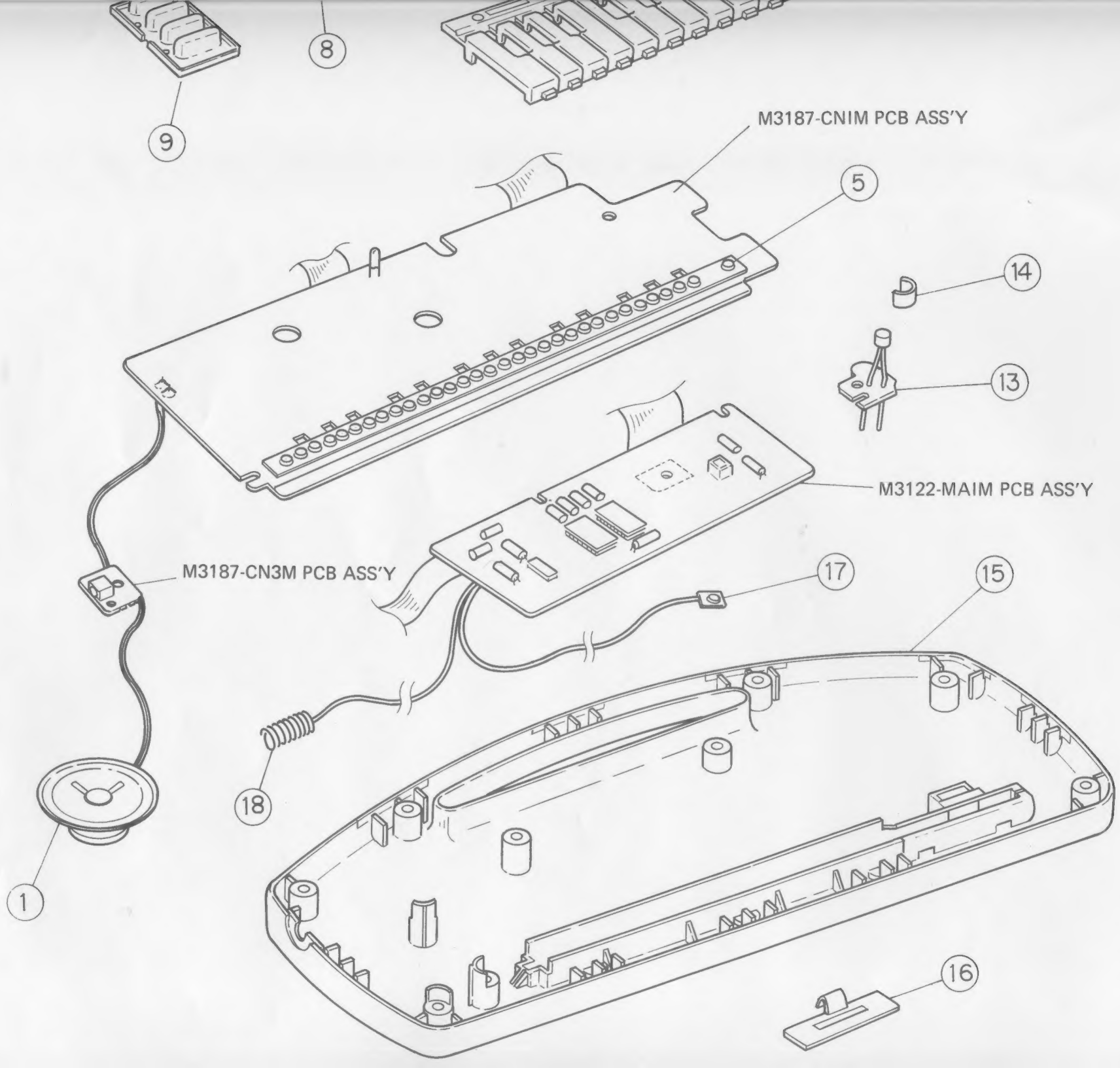
EXPLODED VIEW




8
9
M3187-CNIM PCB ASS'Y
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14
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M3122-MAIM PCB ASS'Y
M3187-CN3M PCB ASS'Y
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